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MAN AND HIS ENVIRONMENT IN AFRICA

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THE Dark Continent is becoming illuminated. For centuries its inhospitable shores offered no inducement to passing ships except as a port of call, or half-way house enroute to the East. Until very recently the great mass of the interior was a sealed book. But one European country after another laid hold of a portion until the zealous efforts of the Powers have partaken of the nature of a gigantic scramble for the continent. Indeed the parcelling of Africa is not yet finished, for at the present writing Italy is appropriating Tripoli in a most lordly manner. Yet with all this international rivalry not the least of the good conquences of the partition is the great increase of geographical knowledge.

SIZE

Physically Africa is a large peninsula—a gigantic continent hanging to the mainland by a small peg, the Isthmus of Suez. But this peg is 87 miles across, and the projecting region is a world in itself. It is equivalent to several continents. Within the confines of this vast region of over 11,300,000 square miles there is room enough for the United States, Europe, India and China, besides the British Isles and the Japanese Empire which could be tucked into the corners and still leave a considerable margin uncovered.

To reach Cape Town, the southermost outpost of the continent, takes 17 to 18 days on the English Mail steamers from Southampton; to round the Cape and travel to Suez requires nearly a month longer.

POSITION

According to Herodotus, the Greek historian of the fifth century B. C., the bounds of the country are given with considerable elasticity: "Where the meridian declines toward the setting sun the Ethiopian territory reaches, being the extreme part of the habitable world." On the outstretched map of modern times, Africa holds a central position, prac-

tically bisected by the equator, and lying for the most part within the tropics. Ocean steamers skirt its shores at all points of the compass; Europe and Asia lie just beyond calling distance on the north and east.

Topography

In spite of its favorable location on the map of the world, Africa is the least well known and the longest neglected of all the continents. Why? The answer is found in *the geographical configuration and natural features which make it not only difficult of entry, whether by land or sea, but tend to isolate much of the interior, making communication between the habitable districts either difficult or altogether impossible.*

In general, Africa is one great, compact tableland of moderate elevation, surrounded by a comparatively narrow belt of low-lying territory. It has been compared to a pie-dish turned upside down, the great plateau and the low-lying belt being represented respectively by the inverted basin and the rim. The "rim" is remarkably rounded and unbroken. Peninsulas, indentations, and natural harbors are conspicuous by their absence. The mouths of the rivers are choked with silt. The low coastal belt is backed by the great interior plateau, sometimes ascending in a series of terraces, or taking the form of mountain ranges which present steep and high escarpments on the side towards the sea. The great sandy and waterless Sahara, nearly 1000 miles in breadth, cuts off the North from the South and the East from the West. Its replica in miniature, the Kalahari of the southern portion of the continent, renders communication between the habitable districts on the other side of the equator similarly difficult.

The great interior plateau is remarkably uniform. Nature seems to have sacrificed diversity and variety to the development of a few natural features of huge size. The rivers, the lakes, and the mountain peaks are few in number but continental in proportion.

But a greater share of this lavish expenditure and magnitude of proportion seems peculiarly profitless and useless in the development of the country. The Niger and the Congo, two of the largest river systems in the world and draining areas of inestimable tropical fertility, are barred at their mouths and broken by rapids and cataracts throughout their courses. The waters of most of its great lakes are brackish or salt. Ruwenzori, Kilimanjaro and the other giants of the plateau are in a region where the snow-line stands at 17,000 feet, but the unlimited water supply need never be tapped for the environs because drenching tropical rains are as constant as the returning day

Climate

The tropical position of the continent and the relief of its land surface combine to produce the greatest extremes in climatic conditions.

Africa has at once the unhealthiest and the most healthy of climates. The western coast is the white man's grave; the southern peninsula is one of the sanatoria of the world. Much of the east coast, like the west, with its swamps and lagoons, sleeping under a tropical sun, is cursed with malarious fevers which render it unfit to live in and even dangerous to cross. The desert air is dry and invigorating. The climate of the table-land, spread out in the torrid zone, would, in the ordinary course of things, be hot but the high level causes the temperature to be lower than it otherwise would be; in consequence the weather is often cold and bleak in the winter season.

TEMPERATURE

The mean annual temperature for Africa is high and the annual variation in range is small. This remarkable uniformity in temperature is explained by the fact that places in the equatorial belt vary little all the year round in the matter of relative length of day and night. A shade maximum of 120° F. is recorded for Northern Nigeria where the annual range is as low as 5° F. In the equatorial belt the average range is generally 10° F. or less. In the dry interior the maximum range reaches 30° F. difference between summer and winter. These temperatures are in striking contrast with the extreme range of 80° F. and 120° F. for North America and Asia respectively.

RAINFALL

As regards rainfall the continent divides itself naturally into three sections: (a) the coastal belt with considerable rains, (b) the table-land with low rainfall, and (c) the desert basin with little or no rain. The rainiest regions are along the west and east coasts where the tropical shore-lands are backed by highlands and where the annual downpour measures 138 inches. From both coasts there is a transition from regions of excessive and moderate rainfall to those of absolute rainlessness in the interior. This diminution from the sea to the interior is strikingly illustrated in Egypt where, at Alexandria, the rainfall is 8 inches, at Cairo 1½ inches, and at Kina practically nil.

GENERAL

The geographical influences of topography, climate and rainfall determine the line of human interest so conspicuously that the continent may be considered under the three previously defined units, the desert region, the coastal belt, and the highlands. In the desert region, by far the best known portion is the strip of flood plain which annually receives the "gift of the Nile". Agricultural interests are the chief concern of the people. From Berber to Cairo this fertile belt, extending from 8 to 10 miles on

either bank of the river, is annually enriched by the fine silt carried down in the flood waters. Seed time and harvest are controlled and prolonged by irrigation. This line of fertility has long been the supporter of a dense population and is destined by reason of the railway project from the Cape to Cairo to continue still longer a line of great importance and human interest.

The numerous and extensive oases scattered over the vast area of the desert are the source of a large share of the world's supply of dates. By tapping the subterranean waters the fertile areas are being increased and in the reclamation of these arid wastes the Saraha, like the Great American Desert, is predetermined "to blossom as the rose."

The coastal belt of the northern and southern portions of the continent, projecting as they do into opposite temperature latitudes, singularly reproduce each other in matters of soil, moisture and temperature, and furnish similar opportunities for agricultural pursuits. The Mediterranean belt, peculiarly adapted to date-palm culture, furnishes the staple product, dates; the Nile delta, the most fertile soil of Africa, produces one of the best grades of cotton grown in the Old World; Algeria, with its immense acreage of esparto grass, yields paper-making material equal to three-fourths of all the rags used throughout the world.

In general, however, the northern belt produces the cereals, the fruits and the vegetables of southern Europe. Indeed, so closely are the interests of the Mediterranean countries of Africa allied with those of southern Europe, that it is not unusual to hear an Egyptian or an Algerian in conversation with a citizen of the Cape use the expression "You people down there in Africa," even in matters of continental policy.

In the coastal belt of the Cape Provinces, two oceans are the rain-sources of the region, markedly influencing the character of the industries. The Indian Ocean supplies rain to the eastern part during summer and gives suitable conditions for grain and grass crops. The Atlantic supplies rain to the southern part in winter and gives ideal conditions for vine and fruit culture. These southern coastal plains rise in terraces to the karoo, one of the most interesting physical features in South Africa. The well rounded and smooth surfaces covered with low, prickly shrubs growing in tufts and interspersed with brilliant flowering plants, present an appearance strikingly like that of a Hottentot's wooley head decked out in ribbons. On these terraces innumerable flocks of sheep, goats and ostriches find a suitable feeding ground. Where irrigation makes the growth of alfalfa possible, extensive ostrich farming forms the leading industry. In 1910 the ostrich feather exportation amounted to $10,500,000, practically the world's supply of plumes.

The west and east coasts of the equatorial belt offer no geographical

attractions to the white man, yet the natural products are so rich and trade in them so profitable, that a considerable European population is engaged in the exportation of the wild products of the country. The oil-palm, the tree of trees in this region, yields an enormous output of oil. The tropical lianas, the creepers and climbers of the jungle, rival the forests of the Amazon in the production of rubber. Cocoa-nuts, gums, wax and ebony take important rank among the exports. Nearly all the exports are products of the jungle rather than of the plantation. Plantations of coffee, cocoa and spices exist, but the very richness of the country acts as a bar to the development of agricultural industries, and if in most places in the world "we are as lazy as we dare be," here one dispenses with the necessity of much exertion in the abundance of fruit and vegetables that grow ready at hand.

In the consideration of the highland region, three important areas are worthy of note: the Sudan and Central Africa, known as the big game country, the Congo forest, and the Veld.

The Sudan and Central Africa are the far-off regions of the continent into which excursions by the white man are today more or less frequent. However, these excursions have in many cases been mere glimpses of a great marching ground of herds of wild beasts whose numbers are still a matter of conjecture, but whose importance is reckoned in the export of ivory, one of the most valuable assets of the country.

In the continuous and almost impenetrable forests of the Congo there is probably the largest tree-clad area in the world, not excepting even the Amazon. India rubber trees are found in larger quantities than in any other region. But much of the Congo is still indefinitely known, for it is unapproachable by rivers in which canoe navigation is possible and infected by the dread African fever which is everywhere rife in the moist tropical heat.

The Veld is today the region of greatest interest and activity in Africa. Roughly it is that portion of the South African table-land extending from the Zambesi to the Cape, and from the Kalahari to the mountains of the eastern seaboard. It is steppe-like in character, clothed with grass, and poor in trees except the mimosa or thorn bush, the "Wachteen-beetje" or "Wait a bit" thorn. Much of the Veld is a great grazing ground for flocks and herds, but cattle-rearing is profitable only in regions free from the tsetse fly. Maize (mealies, in the lingua franca of the Boer) is the staple crop of both the white man and the native. The agricultural possibilities of this fertile plain have not yet begun to be developed, and in this region of slight and uncertain rainfall, will grow and take on larger proportions only as the tiller of the soil lays hold of the principles of scientific agriculture. Unfortunately this department is not yet organized. Meanwhile the agriculturist is engaged in running the gamut of all the indigenous and imported nuisances that are known to science.

The wealth of the Veld lies not in its agricultural possibilities alone, but in its mineral resources as well. It is said that the surface has scarcely been scratched as yet, so rich is the region in mineral deposits. The famous "Blue ground" region, intrusions of igneous rock in the strata of the plateau, is the center of the diamond industry. Kimberley in 1870 is jocularly spoken of as having consisted of a bushman, a thorn tree and a prickly pear; today it is the center of the greatest diamond industry in the world. The largest diamond that has ever been found, the Cullinan, is a product of a neighboring mine near Pretoria. The annual product of the "blue ground" has averaged for years many millions of dollars in value. In 1910 the diamond export reached nearly $43,000,000.

But gold greatly exceeds the rich showing in precious stones. In 1910 the gold export amounted to five times as much as the diamond export. The richest gold fields are on the Witwatersrand (White Water Ridge) popularly called the Rand, at Johannesburg, where the auriferous deposits are found in layers of conglomerate, sandwiched between the strata of the plateau.

The mineral deposits offer the most striking feature in the development of the Veld. The great mining centers at Johannesburg and Kimberley represent the foci of an immense area which is developing its highways, building its railroads, contributing its products and pouring in its laborers. The country far and near is moving forward in response to the stimulus of these natural resourses.

The growth of Johannesburg presents a striking instance of the swiftness with which, in modern times, a natural resource of unlimited wealth and possibilities becomes a center of vital human interest. Twenty-five years ago the site of the city was open veld. Today it is a substantially built, enterprising, commercial city of over 250,000 inhabitants, with parks, boulevards, residential quarter, and all the modern electric improvements. It has everything that a well equipped city should have, except, perhaps, traditions. This transplanting of a city to the lonely veld is one of the triumphs of Africa, a young, new, and crude continent.

The development of the mineral resources has been chiefly instrumental in directing the growth of the main railway system which, in "the Cape-to-Cairo" project, will extend like a midrib through the continent, linking up the smaller roads from the margin where penetration towards the interior has begun from all points of the compass.

These are some of the conspicuous geographical features which are influencing the development of Africa. The richness of the soil, the abundant natural products and the wealth of minerals are under exploitation by the Powers which have laid hold of them, but the vast areas of desert, and swamps, as well as the plague and fevers are gigantic problems which will long remain unsolved, a challenge to the scientific minds of the world.

DRY-FARMING

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By dry-farming we mean the profitable production of crops, without irrigation, on lands that have a yearly rainfall of less than twenty inches. The chief purpose of dry-farming is the reclamation for the use of man of the vast, unirrigable, semiarid areas of the world, which hitherto have been thought hopelessly barren.

The importance of dry-farming is apparent when we consider our extensive areas of arid and semi-arid lands. According to Professor Henry of the United States Weather Bureau, nearly one-half the United States receives an annual rainfall of twenty inches or less. These areas of slight rainfall include eighteen states. Mr. Widtsoe gives the dry-farming territory as more than one billion one hundred and ninety-one million acres. Surely these figures should provoke a lively interest in our subject.

A consideration of dry-farming must first include a review of our knowledge of soils. Soil is rock so pulverized and altered by weathering that it forms a foothold and nourishment for plants. It is composed of fine particles of clay, coarser particles called silt, and still larger grains called sand. These are not arranged with any regularity but are jumbled together in clusters. A sand grain will have many smaller soil grains clinging to it by the cementing power of clay. These in turn will be united into still more complex soil grains through the cementing power of lime. It is only when soil particles are united in this manner into large clusters that it has the desired tilth. This is why ploughing the grund when it is too wet is injurious, for it breaks up these complex soil grains.

The most important factor in giving soil its desired tilth is the presence of clay; therefore soils are classified according to the amount of clay that they contain. Unfortunately the soil of semiarid regions contains little or no clay: in other words it is a sandy loam. It is only after rock disintegration has become complete that we get clay, and moist conditions are necessary for complete rock decomposition. All crystalline rocks, volcanic rocks and shale when decomposed under moist conditions will produce abundant clay, but these same rocks when decomposed under arid conditions form sand almost exclusively. Fortunately the sand of arid sections, unlike the sand of humid regions, produces profitable crops whenever water is applied. The reason is that this sand under humid conditions would have produced clay, hence it possesses some of the properties of clay. Prospective dry-farmers need have little fear, then, if their soil is somewhat sandy.

A further difference between the soil of humid and arid regions is the absence of humus in the latter. The scarcity of plant life in deserts makes the reason apparent. Here again there is a redeeming feature since the humus in arid sections contains nearly four times more nitrogen than in sections where rainfall is abundant.

It frequently happens that the soil in semiarid or arid regions is much more productive than that of humid regions. The reason is that in the latter as the rainfall constantly drains through the soil into the standing ground water it subjects the soil to a perpetual soil wash. This water, as it leaches through the decayed vegetable matter on the surface, becomes charged with carbon dioxide and hence acquires great solvent power. It is then able, in the downward movement, to take up in solution many soil constituents and carry them away.

In arid areas, on the other hand, the rainfall moves downward only a few feet, very rarely reaching the standing ground water. After this rather short descent downward, it is brought back to the surface through the agency of plants and the capillarity of the soil. Since little of this water sinks far enough to unite with the ground water, there is practically no removal of the richer constituents from the soil. It is only natural then that the dry soils of the West should retain a much greater fertility than the water washed soils of the East.

In no other respect does the soil of humid and arid areas so differ as in the nature of the subsoil; for indeed arid districts may be said to have no true subsoil. In regions of abundant rainfall a great distinction usually exists between the subsoil and the soil. The soil is rich in humus and is modified by various cultural operations. The subsoil is an accumulation of fine clay, lime, and other soil ingredients, which through the action of heavy rainfalls, have leached from the overlying soils. It is so compact that roots find it very difficult to enter it, and in fact so little air can penetrate it that it remains unweathered and raw.

In arid regions, the slight rainfall in the form of a film of moisture about each soil grain, slowly moving downward, is unable to carry the clay and other soil particles. As a result the finer soil particles remain in the soil, instead of collecting beneath it as an impervious subsoil. A marked characteristic of the soil of arid districts is that the soil and subsoil are about equally porous. This permits the air to move freely to a great depth and so weather the soil as to render it suitable for plant nutrition. The roots can also penetrate deeply. The most important advantage is that it constitutes an ideal storage for water away from sunshine and winds.

Some semiarid districts, for example parts of the Dakotas, have a distinct subsoil. Instead of the heavy clay subsoil of humid districts we find

here a layer of hardpan. This is the clay, lime, and other soil ingredients leached from the overlying soil. This layer of hardpan is very undesirable from the standpoint of dry-farming as we shall see later. A further hindrance is gravel seams, for in breaking up the continuity of the soil mass, they prevent the upward movement of water stored in the soil depth. From the above it is seen that the the prospective dry-farmer should avoid land having streaks of gravel or layers of hardpan; and that he should insist upon a soil of uniform structure to a depth of at least eight feet.

To appreciate the problems of dry-farming one should understand the root systems of plants, especially those that grow under arid conditions. The chief purpose of roots is to secure the water and mineral foods that are indispensable to plant growth. So true is this that the crop yield is usually proportionate to the development of the root system. Since roots are beneath the ground their extent and importance are usually overlooked. According to Schumacher the roots of a field of clover weigh as much as the clover of the year's crop, and the roots of an oat field equal 43 per cent of the weight of the oats and straw. Nobbe, a German investigator, found that the total length of all the roots of one wheat plant was 268 feet. King of Wisconsin found that a single corn plant produced 1452 feet of roots. Investigations have further shown that the roots of all plants extend much deeper than was formerly supposed. For example the roots of the small grains, oats, barley and wheat, penetrate to a depth of from four to ten feet. Only in irrigated districts do we find the root systems of plants very imperfectly developed. This is because the water is so lavishly supplied that the plants acquire the habit of feeding very near the surface. Upon this principle we are able to account for the fact that if a person begins watering his garden in the spring he must continue to do so throughout the season. Since roots are constantly in search of food and water they will likely best develop in arid regions, for it is here that they must go long distances to secure the needed water supply. The desirability of the loose, permeable subsoil is now apparent.

The dry-farmer, in addition to his knowledge of soils and the root systems of plants, must thoroughly acquaint himself with the annual rainfall over the area that he is to cultivate. All plants require a definite amount of water. This moisture is almost entirely taken from the soil. By growing plants in large pots containing weighed quantities of soil, it has been possible to determine the number of pounds of water necessary for the production of every pound of dry material.

During the eighties King by careful experiments found that in Wisconsin it required 385 pounds of water to produce one pound of oats, 464

pounds of water to produce one pound of barley, 271 pounds of water to produce one pound of corn and 576 pounds of water to produce a pound of clover. In regions where dry farming is likely to be practiced this amount would need to be greatly increased, since in these districts the atmosphere is very dry causing the evaporation to be great. In 1900 experiments were carried on in Utah under Widtsoe and Merrill with the following results: to mature one pound of wheat it required 1048 pounds of water, one pound of corn 589 pounds of water, and one pound of peas 1118 pounds of water. These figures show that far more moisture is required under the arid conditions of Utah, than under the humid conditions in Wisconsin. According to the above figures it requires 45,000 pounds of water to produce sixty pounds or one bushel of wheat. Furthermore, to produce a bushel of wheat it is necessary to produce a corresponding quantity of straw, which would require another 45,000 pounds or 90,000 pounds of water to produce both straw and wheat for one bushel.

Rainfall as we know is measured in inches, and an inch of rainfall on an acre of land weighs about 227,000 pounds. If all of this moisture could be so stored in the soil as to be available for plant production it is easy to see that a rainfall of one inch would produce two and one-half bushels of wheat per acre, and ten inches in rainfall would produce twenty-five bushels. It must be remembered however that by no known system of tillage can all the rainfall be conserved for plant production.

Over most of the semiarid regions the rainfall comes in the winter leaving the growing season rainless. The chief problem then in dry-farming is the storing in the soil of the rain that falls in any season until it is needed for plant growth. Already we have learned that soil is formed of particles ranging from the coarsest sand to the finest clay, and that these unite to form complex soil grains. These clusters of soil grains, while touching at many points, leave pore-space between them which often constitutes as high as 50 per cent of the total soil bulk. The importance of this pore-space cannot be overestimated as it permits the storage of moisture. After a rain these soil pores are filled with water but they cannot long so remain for the pull of gravity soon forces the water downward. In humid regions this water, which is known as gravitational water, sinks until it finally unites with the ground water and is thus lost to the soil. In semiarid regions, on the other hand, as it moves downward it forms a film of moisture about each soil grain. This film is known as capillary water. It is the water that clings to a pebble that has been submerged in water, for there is an attraction between water and nearly all substances. The importance of this capillary water is not at first appreciated. But according to Professor J. A. Widtsoe in his excellent book on dry-farming, from which I have drawn freely, in one cubic inch of ordinary soil the total surface exposed by the soil grains is about twenty-five square feet, all of which

may be covered with this film. So important is the capillary water that according to King it often constitutes as high as 17 per cent of sandy loams.

While in humid regions the farmer is concerned primarily with conserving in the soil the elements of plant nutrition, in semiarid districts the chief concern is the conservation of moisture for plant growth. As the average soil has a capacity for water of about two and one-half inches per foot it follows that twenty-two and one-half inches of water can be stored in ten feet of soil. As this exceeds the rainfall of dry-farming areas the problem is to store up the rainfall of successive years until we have enough for a successful crop. To accomplish this the dry-farmer must as far as posible prevent the direct evaporation of water from the soil, for in arid regions it is by evaporation that most of the water is lost. Unfortunately in dry-farming territory the rate of evaporation is very great, often ranging from six to thirty times the precipitation. This is usually due to high temperature, abundant winds and low relative humidity.

There are two ways of decreasing the rate of evaporation. It is a known fact that water containing any mineral in solution, salt for example, will not evaporate as rapidly as will clear water. This being true the dry-farmer can so richly fertilize his lands that the soil water becoming burdened with mineral plant foods in solution will evaporate very slowly. The farmer under humid conditions has one reason for keeping his land rich, namely that it may afford ample plant nutrition; the farmer under arid conditions has an additional reason—to decrease evaporation and thus conserve soil moisture.

The second method of decreasing the rate of evaporation is to form a protective mulch, or thin layer of dry soil over the surface. The loss by evaporation occurs almost wholly at the surface. This surface evaporation may continue however, until the soil moisture is depleted to a depth of ten feet or more, for the water passes by capillary movement from the soil depth to the surface. A protective mulch decreases the rate of evaporation for the following reason: As soil water diminishes, its capillary movement is retarded. This drying of soil may continue until the capillary movement wholly ceases. That very dry soil and water even repel each other may be seen by driving along a road immediately after a slight rain. The wheels show that the dust is wetted only on the surface. Accordingly, a surface layer of very dry soil prevents the deeper soil water from reaching the surface, since it destroys the capillary movement of soil water. That there would be almost no evaporation from the surface of this dry mulch is apparent. Naturally a chief concern in dry-farming should be the forming and preserving of such a protective mulch.

The dry-farmer must use exceptionally good judgment and be persistent in the cultivation of his soils. Deep fall ploughing will permit the winter's precipitation to sink quickly into the soil depth. The seed should not be sown until enough moisture has been collected to insure a successful

crop, for it is only the dry-farmer who has his deep soil well stored with moisture that can go into the summer with any assurance. The most successful method of collecting the rainfall of successive years for a single crop is by clean fallowing, or resting the ground a season with proper cultivation. Ground clean fallowed and covered with a carefully prepared protective mulch is in the best possible condition to receive and retain moisture. King has shown that soil, clean fallowed, was able to carry over per square foot over nine pounds more moisture than adjoining land that was cropped. In clean fallowing weeds cannot be tolerated for the reason that it requires as much moisture to produce weeds as it does to produce a profitable crop.

Early spring cultivation is necessary if the stored soil water is to be retained. Since the rate of evaporation is greatest when the soil is wet, much of the needed moisture will escape if the farmer permits the early spring days to slip by before he begins spring cultivation. During the summer the most important time to cultivate is immediately after each rain. These summer rains quickly establish connection with the store of moisture in the soil, and are hence often a disadvantage rather than an advantage, as they quickly draw from the deeper soil the stored up moisture.

The writer in this short article has attempted only a very general discussion of dry-farming. The aim has been to give the general reader a clear statement of the more fundamental principles involved, which may be summed up as follows:—

If dry-farming is to succeed the farm must be located in a section having a rainfall of ten inches or more, and with the least possible wind movement. The soil should not contain layers of hardpan nor streaks of loose gravel, but must be uniform in texture to a depth of eight feet. This is necessary to promote the developement of root systems and permit the storage of moisture away from sunshine and wind.

After the land has been cleared it should lie fallow for one year, in fact it should never be sown until sufficient moisture has been stored in the deep soil to insure a crop. Deep fall ploughing will permit the accumulation of the winter's precipitation. Early spring cultivation is necessary if the stored up soil moisture is to be retained. Throughout the entire growing season no pains should be spared in forming and preserving a protective mulch or a dry soil covering.

The dry-farmer should keep in mind that his is a system of agricultural practice that requires the constant application of skill and intelligence. But he may be assured that whenever correct methods are applied the results will be satisfactory.

THE TEACHING OF PLACE GEOGRAPHY

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A complaint quite commonly made against the present day teaching of geography is this: Students do not know where places are; they can not locate on a wall map the great cities of the world, or other important places. The complainer often concludes: What we need is some of the good, old fashioned geography such as we used to have when we were taught places, capes, rivers, gulfs, bays, cities, mountains, countries,—places, places, places.

The complaint is too serious to be overlooked by those responsible for the teaching of geography in the schools of to-day, but the frequent recommendation that we again teach places as the prime desideratum in geography is too shallow to be seriously considered by well informed teachers of geography. Geography as a school study is too rich in valuable subject matter from the standpoint of information, good citizenship, and mental discipline to revert to a mechanical learning of places. On the other hand a knowledge of important places, as ready for instant use in the general affairs of life as the multiplication table, is of too great importance to be smothered out by the purely descriptive phases of the topic treated.

The hopeful aspect of the situation, however, is the fact that the two phases of geography mentioned above are not mutually exclusive but mutually helpful. The one who knows most about the valuable information-giving topics of geography, knows best the place relations of that topic,—the countries, states, cities, river basins, transportation lines, etc., connected with the topic. Place geography is essential to the mastery of all large geographical topics. Failure to recognize the teaching of places, with the necessary drill to fix them in the minds of pupils, as essential to understanding the usual topic of the physical and industrial phases of geography, has been responsible for much poor work in place geography. On the other hand, a good knowledge of place geography ready for immediate use, is a most valuable aid in vigorous and ready development of all large geographical topics.

It behooves the teachers of geography, therefore, to see the strong bond of mutual helpfulness between these two phases of the work, and to use methods of teaching which shall strengthen both lines of study in the geography classes. As the A B C 's and multiplication table are not the total of reading and arithmetic, so a knowledge of places alone is not the total of geography. But as reading, the use of the dictionary, and

the problems of daily life can not be well done without a very thorough mastery of the alphabet and multiplication table, so geography in its large and interesting features can not be well done without a very thorough knowledge of a considerable number of places.

The foregoing, in its general statement, may be admitted by all. The differences and difficulties begin to appear the moment we undertake to construct a "multiplication table" for place geography. The pupils are sure to see and hear the names of more places than either pupils or teacher should endeavor to fix permanently in mind. However, the correct teaching of each large geographical topic, such as corn growing, the cotton industry, the iron and steel industry, cattle ranching, a trip to Yellowstone Park, Chicago as a commercial center, will fix in memory a few places which are vital to any adequate study of the topic. The same places will come up often in different topics and the importance of the places will thus be emphasized.

Although such work may be well and thoroughly done, it is necessary for teachers to examine the permanent results from time to time, and devise ways and means for driving home the names and locations of such places as every intelligent citizen should know in order to appreciate the great world movements that are constantly presenting themselves through the newspapers, magazines, lectures, and daily conversation.

The teachers of the Illinois State Normal University have recently co-operated in an effort to get at the actual facts, and thus to learn what the situation is, and to make a concerted effort to improve the work in teaching place geography. To this end, a test was made which included all pupils in grades five to eight, the entire high school, and the commercial geography classes in the Normal School. The test and its results are here given just as carried out. We all agreed that pupils should be taught place geography sufficiently well to enable them to name correctly the forty-eight states on an outline map of the United States on which the state boundaries are represented, but no names printed. Each class was tested without warning. Each pupil was handed an outline map of the United States and asked to look at it and try to think the names of the states. About two minutes were allowed for this preliminary examination. They were then asked to enter the abbreviations for the names of states in proper places on the map. At the end of ten minutes all maps were collected. In grading, two per cent. was deducted for each omission or mistake. The following table shows the results of the first test:

The average grade for the 140 pupils of the elementary school is 61; for the 114 high school pupils, 73; and for the 41 normal school students, 82. The average of the 295 papers is 68.

Grade	Total number of papers	Number of perfect papers	Average per cent.
5	33	0	49
6	29	3	57
7	36	1	54
8	42	3	79
1st Yr. H. S.,	48	1	67
2nd. Yr. H. S.,	26	2	75
3rd. Yr. H. S.,	29	1	74
4th. Yr. H. S.,	11	1	86
Normal School,	41	13	82

On the day following this test, each pupil was furnished with another outline map of the United States and given directions for home study.

After a week, a second test was given after the same manner as the first with the following results:

Grade	Total number of papers	Number of perfect papers	Average per cent.	Gain per cent. over 1st test
5	33	8	84	35
6	30	17	92	35
7	34	7	77	23
8	47	20	90	11
H. S., all years,	127	70	93	20
Normal School,	40	30	99	17

The eagerness of the pupils to study the maps and take a second test indicated that the work was interesting to them. The increase in per cents. of the second test over the first shows that without special class lessons pupils may learn place names accurately in a short time.

The teachers agreed that some means was desirable by which rapid and accurate drill on place geography could be carried on. The device should be as readily placed before the pupils as the ever present multiplication table, and the answers should be possible only by the pupil's own mental effort.

To this end a special outline place map of the United States was devised. This map is 7 by 10½ inches. The state boundaries are strongly marked. The states are numbered in order of area. The capitals are represented. The cities having a population of 100,000 or more in 1910 are indicated. Twenty-six rivers are indicated by letters for ready reference. About twenty mountain chains are represented. On the reverse side of the map are printed directions for its use. Here the states are named in order of population, census of 1910. The fifty largest cities are named in order of size. The mountains are named from east to west. The important coast features are listed in geographical order. The study of the place map requires frequent reference to maps in the text book to get names and

locations. The outline map serves for rapid oral drill, which pupils enjoy keenly. The place drill is accomplished in a small fraction of the time required by other methods.

The map is published by McKnight & McKnight, Normal, Illinois, and sent postpaid for 80c per hundred.

The writer of this article will appreciate reports of tests in place geography which may be carried on in other schools; also suggestions as to how the above plan of test and place map may be improved.

NOTES—ECONOMIC GEOGRAPHY

By EDWARD VAN DYKE ROBINSON,
University of Minnesota, Minneapolis

MEXICO

LAND *and Labor.* Much has been written about "barbarous Mexico", and lurid descriptions have been given of the conditions of practical slavery in which the laboring class or peons are kept. The basis of this system of semi-servile labor is the existence of great landed estates which reproduce many features of the Feudal System. These estates are, partly as a matter of custom and tradition, being held intact from generation to generation as a means of social distinction and political influence. In part, however, they are the result of geographical conditions. In a region like Illinois or Iowa, where one piece of land is much like another, a man can buy a quarter section or a half section and establish an independent farm; but in a very broken country, especially if it is semi-arid, this is impossible. Much of the land in such a region is worthless or is of value only for pasturage if associated with other and better lands. Practically all the land, moreover, is worthless without water. It follows that a country of insufficient rainfall tends naturally to great estates, small holdings under such conditions being practically worthless unless under a system of government irrigation.

However it may be from the social viewpoint, the system of large estates in a country like Mexico is not without its economic advantages. The owners of land have sufficient capital to experiment with blooded stock and improved methods. Indeed, they have much the same advantages which centralized control in manufacturing industries has revealed,—economy of management, avoidance of waste and the utilization of by-products. This system produces agricultural centers instead of scattered farmsteads, and a considerable degree of culture among a small class in the midst of pioneer conditions. The owners of these estates are also important men in the economic life of the town. The result is that the middle men of the town frequently find themselves subordi-

nated in the business world to the plantation owners or producers. Some of the large land owners even have their own mills to work up their products, and their own stores to handle them. The contrast of these conditions with those which obtain in most agricultural sections of the United States is certainly striking.

In spite of the difficulties just named, American companies have bought up numerous estates in Mexico and are seeking to attract settlers from the United States. The chief takers of these lands are Californians from Los Angeles and that vicinity, doubtless because of their familiarity with approximately similar conditions. It may be noted however, that most of the estates so far subdivided are situated on the Pacific slope, in regions of adequate rainfall, where the difficulty of operating small farms is much less serious.

Rubber. Not many years ago a new source of rubber was discovered, the Guayule plant, native to the arid plateau regions of Northern Mexico at an elevation of 6,000 to 8,000 feet. The rubber is obtained from the roots of the plants, which are thus destroyed at one harvest. The wild plants have now become so scarce that Guayule plantations have been established in districts where little else will grow, as the plant thrives with even less than 14 inches of rainfall a year.

Sugar Cane. The cultivation of sugar cane appears to be increasing in the "hot lands" of Mexico. It is carried on up to 1,000 meters (3,280 feet) altitude but the best crops are seldom obtained higher than 500 meters (1,640 feet). In the regions where cane is grown the rainfall ranges from sixty to eighty inches. It is, however, practically confined to half the year, hence irrigation is extensively used on the best plantations.

Petroleum. For some years there have been reports concerning the presence of petroleum deposits near Tampico. During the last year two large wells have been developed, one producing 20,000 and the other 15,000 barrels a day. These wells are situated at Juan Casiano from which place the oil is pumped to Tampico through a pipe line. The success of these wells has produced quite an extensive speculation in oil lands and many new companies have been organized to sink wells.

Guano. Several small islands off the Campeche coast of Mexico are said to contain 5,000,000 tons of guano reckoned to be worth $30 a ton. This guano is less valuable than that from the Chichina Islands which commands $100 a ton, owing to the greater rainfall on the Mexican coast and the consequent leaching of the guano.

Sulphur. In Lower California, about fifty miles from the boundary, at Calexico, deposits of sulphur in commercial quantities have recently been discovered. The deposits have been exploited to some extent but active mining operations will require considerable investment of capital. The ore is said to average over 45 per cent. sulphur.

CUBA

Bananas. In three districts of eastern Cuba bananas are grown for export to the United States. These districts lie around Nipe Bay, Tanamo Bay and Baracoa. During the last decade the banana industry has declined because of greater returns from land planted to cane, and because the winters are too cold and dry to produce the finest fruit such as is obtained in Jamaica and Central America.

Foreign Trade. Since the reciprocity treaty with Cuba in 1903, the United States has become predominant in the commerce of Cuba. In 1910 the United States took 86 per cent. of the Cuban exports and supplied 50 per cent. of the Cuban imports. This discrepancy between exports and imports is due to the fact that the Cubans have more personal and educational relations with Europe than with the United States and the further fact that the bulk of the immigrants to Cuba are from Europe, especially from Spain. Curiously enough, however, Spain seems to be losing in her proportion of Cuban commerce while France has nearly doubled her portion in the last two years, standing now ahead of Spain.

Iron Mines. During 1910 several new iron mines were discovered on the north coast of Cuba, in the vicinity of Moa. The Pennsylvania Steel Company has already erected a considerable plant on Nipe Bay for the preliminary treatment of the ore. Manganese on the other hand is not now mined in Cuba because the ore is of a low grade which cannot be mined in competition with the ore from the Black Sea region, which now furnishes the principal supply used in the United States.

BRITISH WEST INDIES

The British West Indies were more prosperous in 1910 than for many years past. The causes of this change are, first, the increased price of sugar due to the abolition of the export bounties on beet sugar by European countries; second, the increased production of cocoa in Trinidad, Granada and Jamaica; third, the development of the American fruit trade in Jamaica; fourth, the introduction of sea-island cotton in St. Vincent, Barbados and the Leeward Islands; fifth, the increased cultivation of limes in Dominica; sixth, the development of rice cultivation in British Guiana. The rice plantations in Guiana now cover 38,000 acres. As recently as 1895 the rice imports into Guiana were 34,000,000 lbs., while in 1909 the local supply not only met the demand but left 8,300,000 lbs. for export. The Guiana lowlands, lying largely below sea level, were originally diked and reclaimed by the Dutch, and they are extensive enough to form an important factor in the rice production of the world.

ILLUSTRATIVE MATERIALS FOR GEOGRAPHY

By W. M. GREGORY,
Cleveland Normal Schcol, Cleveland, Ohio

THE teacher of elementary geography needs to acquaint a child with the *things* of geography as well as their names. Well selected illustrative material is constantly demanded and the following list of sources has been prepared for the convenience of those who wish to procure such material. In each case there will be an express charge and many of the firms charge a nominal sum for the advertising samples and materials.

Wheat and flour.—Washburn-Crosby Co., Minneapolis, Minn.; Pillsbury Company, Minneapolis, Minn.

Corn and corn products—Corn Products Manufacturing Co., Chicago, Ill.

Silk.—Belding Bros. Co., New York City; Nonontuck Silk Co., Florence, Mass.; Cheney Bros., South Manchester, Mass.

Cocoa and chocolate.—Huyler's, New York City; Walter Baker & Co., Dorchester, Mass.; Walter M. Lowney, Boston, Mass.

Cotton and by-products.—Hoosier Sheeting Co., Cannelton, Ind.

Wool.—Lone Star Woolen Mill Co., Minneapolis, Minn.; Globe Woolen Company, Utica, N. Y.; Thomas Oakes & Co., Bloomfield, N. H.

Cattle and meat packing.—Morris & Co., Chicago, Ill.; Armour & Co., Chicago, Ill.

Petroleum.—Standard Oil Co., No. 5 Wabash Ave., Chicago, Ill.

Vegetable ivory and buttons.—German-American Button Co., Rochester, N. Y.

Rubber and rubber goods.—Hartford Rubber Co., Hartford, Conn.

Graphite and pencils.—Eberhard Faber Co., New York City.

Thread.—Clark Thread Co., East Newark, N. J.; The Spool Cotton Co., No. 80 White St., New York.

Rock salt and brine.—Diamond Crystal Salt Co., St. Clair, Mich.

Paper.—Butler Paper Co., Monroe St., Chicago, Ill.

Manila hemp and sisal.—International Harvester Co., No. 7 Monroe St., Chicago, Ill.; McCormick Twine Co., Chicago, Ill.

Condiments, especially spices.—Thompson, Taylor & Co., Michigan Ave., Chicago, Ill.

Shears.—J. Weiss & Sons, Newark, N. J.

Veneer woods.—Acme Veneer and Lumber Co., Cincinnati, O.; W. W. Kimball Piano Co., Chicago, Ill.

Asphalt.—Trindad Asphalt Co., St. Louis, Mo.

SUPPLY COMPANIES

The following firms or individuals have for sale raw materials that are suitable for use as illustrative material in geography. There is a considerable range in the kind and quality of the materials offered:

1. Philadelphia Museums, Philadelphia, Pa.;
2. Central Scientific Co., Chicago, Ill.
3. Ward Natural History Co., Rochester, N. Y.
4. Foote Mineral Co., Philadelphia, Pa.
5. Howell's Microcosm, Washington, D. C.
6. Department of Geography, Normal University, Normal, Ill.
7. The Geography Supply Bureau, Ithaca, N. Y.
8. Standard Industrial and Commercial Exhibits Co., N. Y.
9. Commerce and Industry Co., Boston, Mass.
10. Tiffany Industrial Cabinet Co., Chicago, Ill.
11. Les Fils D'Emile Deyrolle, Paris.
12. A. Pechler's Widow & Son, Vienna, Austria.

CURRENT NOTES FROM GOVERNMENT PUBLICATIONS

POSSIBILITIES *of the Goat industry.* The Bureau of Statistics states that 250 million dollars have been sent out of the country in the last decade to purchase goat skins for use in this country, and that the commercial value of the 500 million goats which these skins represented would, had they been grown in the United States, have approximated a billion dollars. The report of Consul Canada presents the result of the three-years' experiment in goat raising on a farm in the State of Guerrero, Mexico, as follows:

"In 1904, the manager of the farm received 66,000 goats, including large and small, at a valuation of $1.50 each, equal to $99,000. From the produce of these he sold, during nine months of 1904 and the years 1905 and 1906, 50,000 head at $5 each, equal to $250,000, and had, at the close of 1906, 88,000 head on the farm, being 22,000 more than he started with. The result was, counting the value of the 22,000 increase at $1.50 each with the foregoing sales, the investment of $99,000 produced in less than three years $283,000, besides the original stock of 66,000 goats was intact." (Figures in Mexican currency.)

The above facts suggest possibilities in the increase of the meat supply of the United States, while retaining at home the hundreds of millions of dollars now sent abroad for the purchase of goat skins, and producing

this supply of valuable material on lands now practically unutilized. The number of goats now produced in the United States is small compared with that of many other countries; the United States produced, in 1910, about 3 million; Mexico, 4¼ million; Turkey in Asia, 9 million; British South Africa, 12 million; and British India, 34 million.

Automobile exports. Twenty thousand automobiles were exported from the United States in the last fiscal year, and their value, including parts and accessories, approximated $27,000,000. The total for 1912 is in marked contrast with the figures of a decade ago, 1902, which were less than $1,000,000. Approximately 25 per cent. of the automobiles exported from the United States are shipped to Canada; about 40 per cent. to Europe, chiefly Great Britain; about 20 per cent. to Australia. While France still leads the world in exports of automobiles, the United States surpasses that and all other countries in rapidity of growth of production and exportation. Of the automobiles imported into the United States, France supplies about one-half.

Quinine imports. Nearly 15 million dollars' worth of quinine and the material from which it is extracted has been imported into the United States during the past dozen years. Cinchona, or Peruvian bark, is the product of a number of trees indigenous to Peru, Ecuador, and Bolivia, formerly the chief producers of that article. Later the cinchona tree was transplanted from South America to Java, India, Ceylon, and certain other countries, and its cultivation developed until Java and the British East Indies have become the world's chief producers of cinchona bark.

Copper. The growth in exports of copper, from less than $1,000,000 in 1882 to a total of $110,000,000 in the current fiscal year, has brought this article to fifth place among the great export staples of the country. Taking the ten leading articles, copper manufactures rank fifth, the relative standing being: raw cotton, iron and steel, meat and dairy products, breadstuffs, copper manufactures, refined mineral oil, wool manufactures, leather and manufactures, coal and coke, and cotton manufactures.

Trade with the Philippines. The trade of the United States with the Philippine Islands has more than doubled since the enactment, in 1909, of the law providing for the free interchange of merchandise between those islands and the United States. The total trade between the United States and the Philippines during the fiscal year exceeded 40 million dollars, against 20½ million in 1909, the last year prior to the enactment of the law.

Cement production, consumption, imports and exports. Cement production, consumption, and exportation are showing remarkable increases in the statistical records of the United States. The quantity produced has

grown from 8 million barrels in 1890 to 78 million in 1910. The quantity of cement exported has grown from 76,055 barrels in 1900, to 2,971,474 barrels in 1911. On the import side the decline has been as rapid and striking as the increase on the export side. The United States is apparently leading the world in the production of cement for industrial purposes. The cement in question, which is chiefly of the class designated as "Portland" cement, is produced by burning a finely ground artificial mixture made of limestone or marl with clay or shale, or by substituting low magnesia blast furnace slag for the clay or shale. Pennsylvania is by far the largest producer of cement, about one-third of the 78 million barrels produced in 1910 being the product of that state. Panama now takes over 65 per cent. of the cement exported from the United States.

Typewriters and other delicate machinery in the export trade of the United States. The United States leads the world in the exportation of typewriters. For the fiscal year which ended with June, the total was about $12,000,000, or eight times as much as in 1897. This rapid development in exports of typewriters is typical of many other intricately constructed and delicately adjusted machines of American manufacture, such as cash registers, scales and balances, electrical appliances, including telegraph and telephone instruments, sewing machines, printing presses, and automobiles. Most of the typewriters exported from the United States are sent to Europe, where business and industry have long been in a state of high development.

Coffee. More than one-third of the 2½ billion pounds of coffee annually entering the international commerce of the world is consumed in the United States, its imports of that article being twice as much as those of Germany, three times those of Netherlands, four times those of France, nearly ten times those of Great Britain, and half as much as those of all Europe, next to the United States the great coffee-consuming section of the world. The world's leading coffee-producing countries are, Brazil, 2¼ billion pounds in 1909; Venezuela, 94 million pounds; Mexico, 80 million; Colombia, 92½ million; Porto Rico, 45 million; Haiti, 41 million; Dutch East Indies, 35 million; British India, 28 million; Arabia, 15¼ million, and Abyssinia, 10 million. The world's supply in 1909 aggregated nearly 3 billion pounds, but in 1910 fell below 2 billion pounds, due to a decrease of about 950 million pounds in the exports from Brazil. Brazil is now, and has for many years been, the chief source of the coffee imported into the United States. Of the 875 million pounds imported last year 651 million pounds were from Brazil, as against 224 million from all other parts of the world, chiefly American countries. The second largest source of our imported coffee is Colombia, 52 million; Venezuela, 40 million; the United Kingdom, 27 million; Mexico, 25 million; the Dutch East Indies, 9 million; Haiti and Santo Domingo, 4 million, the British West In-

dies, 2 million; Netherlands, 2 million; Aden, 1½ million; Turkey in Asia, 1 1-3 million, and Germany, 1 million pounds. Less than 15 million pounds are imported from Asia, even including the arrivals from European countries whose exported coffee is, presumably, largely the product of their Asiatic colonies. The average price of the coffee imported into the country has doubled in the last few years. Domestic consumption per capita reached its highest total in 1902, 13.34 pounds, and fell to 9¼ pounds in 1911. Porto Rico and Hawaii are the only portions of the United States in which coffee is produced and from which it is exported in any considerable amounts.

Alaska. The economic conditions prevailing in Alaska prevent speedy settlement of the Territory by farmers. Transportation is too expensive for the poor man to go there and take up land, and the farmers who are well-to-do do not leave the States.

Winter rye and winter wheat can be successfully grown in interior Alaska whenever the snowfall is deep enough to protect the grain against severe winter temperature, say from 2½ to 3½ feet. Rye is hardier than wheat and therefore the more successful of the two grains; but it is expected that the Experiment Station will develop varieties of these grains suited to the climatic conditions. Siberian alfalfas which the Department of Agriculture secured through Prof. N. E. Hansen, of South Dakota, from the vast semi-arid regions of western Siberia, have been introduced, and have been grown at the Experiment Station at Rampart, in latitude 65°, 30', where all the experiments with grains and various plants are conducted. If another year should prove that they can maintain themselves, an important problem in Alaskan agriculture will have been solved.

The climate of the coast region is modified by the proximity of the Pacific Ocean. The winters are comparatively mild but the summers are cold and moist. The lowest temperature at Sitka the past winter was 14° above zero and the highest temperature on record at the same place during a period of upwards of 75 years is 87°. The maximum temperature frequently does not exceed 75° and sometimes it does not reach that high during the entire growing season.

THE WINDS IN "ROBINSON CRUSOE"

PROFESSOR Martzoeff's suggestive article on the Symbolism of Robinson Crusoe, in the May *Journal* stimulates me to put in a word on an item in the geographic matter of the tale. It is astonishing how clear was Defoe's understanding of the winds of the North Atlantic. Remember Crusoe came out in 1719 and it is fiction. Had it been the actual diary of a mariner it purports to be it could hardly better record habit-

ual facts. Take the Captivity in Morocco. The reader of Robinson Crusoe may have some trouble to find Sallee on his map. The ship was between the Canaries and the African coast when taken and when Crusoe escapes in the long boat he has Spain and the Straits to the north of him. This locates Sallee definitely enough. On this occasion of the escape, "the wind blew from the N. N. E." That is the habitual trade wind of this zone, inclining to northerly on the African coast and easterly on the American, exactly the wind that took Columbus south to the Cape Verdes and west to the Bahamas, the wind that makes the Canaries Spanish and the Cape Verdes Portuguese. The text, however, does not let on that Defoe knew of the prevalence of this north-north-east trade. Quite the contrary, for he makes Crusoe say: "[This] was contrary to my desire; for had it blown southerly I had been sure to have made the coast of Spain, etc." Exactly so Robinson in his ignorance of the facts, might have thought it out. But the trade wind knew its business then as now and bore him southerly along the African coast out of the realm of Morocco to the land of lions and black men.

Similarly on the ill-fated voyage that ended with the wreck at Crusoe's island. It will be recalled that Crusoe, then a planter near Bahia, Brazil, was to get slaves from Africa for himself and his planter neighbors. He sailed in September northward along the coast by Cape San Roque. "We lost sight of land, and steered as if we were bound for the Isle *Fernand de Noronha,* holding our course N. E. by N. and leaving those isles on the East; in this course we passed the line in about twelve days' time, and were by our last observation in 7 degrees 22 minutes northern latitude, when a violent tornado or hurricane took us quite out of our knowledge; it began from the South East, came about to the North East, from whence it blew in such a terrible manner that for twelve days together we could do nothing but drive." After this he found himself off the north coast of Guiana [Guinea!] between the mouths of Amazon and Orinoco.

There are a number of very interesting points about this description: one is the month, September, precisely when tropical cyclones are most frequent; another is the position, 7° 21′ north of the equator. I quote from Davis' Meteorology, p. 192, "It is noticed in these months [August, September and October] the equatorial calms or doldrums migrate farthest north of the equator, and that in tracing cyclones backward along their track, it is in the calm region of warm, moist air between steady trades that the apparently convectional overturning of the West Indian cyclones has its beginning." As to the storm he met, the succession of winds is not perfectly clear. He would seem to have sailed into the winds of its easterly side, S. E. winds; have been blown through the eye of the storm to the westerly side, N. W. winds, and then have gotten into the northerly part where the winds would be from the northeast. Whether a sailing ship could actually be driven in this way I do not know, but it is clear

that the writer had a fair idea of the wind changes actually to be met in tropical hurricanes, or else was reporting the real story of some one who had had experience with them. How they stood off for Barbadoes and were finally wrecked in another storm, on one of the Windward Islands, is not to the present point, though few readers have so definite an idea of the location of Crusoe's island. But it has always seemed to me that the acount of these winds was prophetically intelligent for a romancer.

MARK JEFFERSON.

EDITORIAL NOTES AND COMMENTS

Geography in the Universities

MISS Winsted's report in the June JOURNAL OF GEOGRAPHY, of the results of her inquiry into the growth of geography teaching in American universities shows a number of interesting things. During the last decade this growth is nothing short of remarkable. In 1901, only Chicago among the universities enrolled over 100 students in geography. In 1910, no less than fourteen universities each enrolled over 100 such students, while three, Wisconsin, Chicago and California, each enrolled over 500. In the fourteen universities, there were over 4000 enrollments in geographical courses. If Chicago's summer quarter, which is in reality a part of her collegiate year, be included, then that single university had 800 enrollments in geography; probably more than all of the American universities together had ten years ago. Only the smaller among the state universities do not offer courses in geography.

It is also noticeable that the western universities are, as a group, making more of geography than are the eastern schools. Harvard, Yale, Cornell, Columbia, Pennsylvania and Princeton all enrolled fewer students in geography than did the large western universities such as California, Chicago, Wisconsin, Minnesota and Nebraska.

With the exception of five, all of the universities which were listed have geography affiliated with the department of geology. In Germany, geography practically always goes with history. This is, in a way, significant. It indicates why the Germans find it easier to "humanize" geography than we do. Their leading geographers have been trained in history; most of ours have been geologists.

Physiography easily holds first place among the various phases of college geography; meteorology and climatology combined come next, followed by regional geography and economic geography.

On the whole, the showing is most gratifying. We may reasonably expect that in another decade or two geography will occupy a co-ordinate position with other sciences in American universities.

Geography in the Secondary Schools

Meanwhile, what of high school geography? What is happening to it? In the South and in parts of the West, physical geography is gaining ground. In the East and in parts of the Middle West, it is losing. We think it will continue to lose ground a little longer, but not permanently. Our reason for thinking so lies in the facts discussed in the preceding item on college geography. Even at present the colleges are graduating too few trained teachers to fill even the best high school positions in geography. But the rapid growth of geographical courses in the colleges, and the great increase in the number of college graduates who will be prepared to teach geography, must ere long be felt in the high schools. The most common complaint that has been made against physical geography in the high school has been that it is taught by unprepared teachers. It is inevitable that the present vigorous growth of geography in the universities will improve the work in the lower schools. The change will come slowly but it will come. The normal schools with their over-crowded curriculums do not, under present conditions, do very much for geography. There are some notable exceptions, but we wish there were more.

Economic, Commercial, or Industrial Geography

There is unmistakably a drift in the high schools toward some phase of economic geography. The New York State Syllabus calls for such work in the seventh and eighth grades. A new book for use in these grades has just appeared.* Of the recently published text-books for high schools, more are in the field of economic geography than in the field of physical geography. In the University of Wisconsin Summer School, considerably more teachers now call for commercial geography than for physical. We do not think this is an altogether desirable trend; but it is a natural one considering the present movement toward practical and vocational studies. Commercial geography usually proves to be more interesting to boys than does physical geography, but it is capable of great abuse at the hands of the teacher who thinks that memorizing a host of facts about commerce constitutes the study of commercial geography.

* By Keller and Bishop, Ginn & Co., New York and Chicago.

RECENT PUBLICATIONS

EARTH FEATURES AND THEIR MEANING, by W. H. Hobbs, Professor of Geology at the University of Michigan. The Macmillan Company, New York, 1912. $3.00.

The new book by Professor Hobbs is given the sub-title: "An Introduction to Geology," and the impression obtained is distinctly that the volume is an introductory textbook of geology. As a matter of fact it is largely physiography with a geological emphasis. It contains nothing in regard to stratigraphy, historical geology and paleontology. A few of the titles of the thirty-one chapters will give a conception of the contents of the book. They follow:

The Figure of the Earth.
The Rocks of the Earth's Surface Shell.
Contortions of the Strata within the Zone of Flow.
The Interrupted Character of Earth Movements.
The Rise of Molten Rock to the Earth's Surface.
The Attack of the Weather.
The Life Histories of the Rivers.
The Travels of the Underground Water.
The Features in Desert Landscapes.
The Glaciers of Mountain and Continent.
The Uplift of the Land at the close of the Ice Age.
A Study of Lake Basins.
The Origin and Forms of Mountains.

The volume is remarkably well written and is easily apprehended by those who have no previous knowledge of science. It should be very useful to students of geography as well as those interested in an elementary knowledge of geology. A. N. W.

GENERAL AND REGINAL GEOGRAPHY. By J. F. Unstead and E. G. R. Taylor. xii+516 pages. 133 diagrams and sketch maps. George Philip and Son, Ltd., London, 1911, 6 shillings. 8½x5½.

The authors are English lecturers in geography, of collegiate rank. The book is sufficiently advanced for use in college classes, or in higher classes in normal schools. There is no American book of similar kind. Gregory, Keller and Bishop's *Physical and Commercial Geography* approaches nearest to it but differs materially.

The English book really comes nearer to satisfying the recommendations of the committee of the Association of American Geographers, made at the Boston meeting in 1909, than any American book that appeared prior to Dryer's *High School Geography.*

One half of the volume is given to World Geography, or General Geography. An American is impressed by the small amount of space given to land forms and physiographic processes—only one chapter in all. Such topics as Weathering, Stream Erosion, Glaciers, the Glacial Period, and Wind Work are dismissed with a half page or a little more each, while our texts usually give a chapter to each. The Atmosphere and Climate receive four chapters, while the Distribution of Life Forms, Peoples and Industries get four more. What we usually mean by Physiography, receives but scanty treatment.

Part II, Regional Geography, attempts to say something—often very little—about almost every country on the globe. Over half of Part II is devoted to Europe and more space is given to the British Isles than to North and South America combined. The maps are black and white, are employed chiefly to show distribution and have a crude appearance. Like nearly all English text books, this one has not an attractive look. The book has, nevertheless, a great deal of genuine merit. Its style is simple and it contains the kind of geographical information that people need. It lays emphasis on causal relations; explains as well as describes. It attempts to do too much, however, for it is impossible to say something about every one of the countries of the earth and the main colonies of European nations in 250 pages, and not have a scrappy treatment. This quality of scrappiness characterizes practically all of our own regional geographies. We must get away from it if we desire to do more than store the memory for a day with disconnected facts. It is doubtful if the book will serve American needs, primarily because of the short treatment accorded the Americas, but it does offer some excellent suggestions to our textbook makers, and for a general elementary course in college it might prove pretty satisfactory if supplemented with a fuller treatment of our own country.

RABENORT'S GEOGRAPHY. By William Rabenort. 2 Vols.; Europe, viii.+231 pp. North and South America exclusive of the United States, viii.+230 pp. American Book Co., 1912. 50 cents per volume. 8¾x5½.

Dr. Rabenort is a public school principal in New York City. He says: "Geography is conceded to be an eclectic subject" and that in his books he includes those facts of history, biography, art, science, travel and general information which have distinct geographical aspects and which are commonly regarded as fundamental to general culture. The emphasis is on the human, not on the physical side of geography. Questions are freely introduced; the maps are necessarily small but they are clear; the illustrations are good; and the small size of the volumes makes them easy to handle. In general plan, the books are a return to the informational type which geographers have been trying to replace by a rational treatment of

geographic facts. There is the same effort to condense and compress many facts into small space, that is quite commonly found in elementary texts. An effort to point out causal relations is here and there apparent but the "compressing" process prevents much success in this direction. The books are written in admirably natural and simple English, and present a pleasing appearance, but they do not mark any forward step in the field which they cover.

COMMERCIAL GEOGRAPHY, GENERAL AND REGIONAL. By J. F. Unstead and E. G. R. Taylor. viii.+238 pp. 25 sketch maps. George Philip & Son, London, 1911, 2 sh., 6 pence.

Based upon the larger *General and Regional Geography* by the same authors. The book, in appearance and mechanical make-up, has the usual characteristics of English geographical textbooks,—small size, narrow margins, opaque and unglazed paper, sketch maps and free use of boldface type for purposes of emphasis. Ten per cent. of the space is given to Part I, Climate, Vegetation and Natural Regions; twenty per cent. to Part II, Industries and Products, and the rest to Part III, Regions of the World. The book is for use in schools of the British Empire and naturally stresses the geography of the British Isles and colonies. Germany receives 6 pp., Russia 5, the United States 9 and Japan 2. Geography is considered to be concerned primarily with "distributions". The causal idea is recognized but can not be emphasized in the limited space. The constant use of an atlas is advised and expected; the book contains no colored maps. Statistics are avoided, diagrams, curves and other graphic methods of showing quantitative facts are omitted. It has the virtue of compactness and rational treatment but for American schools would not do so well as our own modern commercial geographies.

LABORATORY EXERCISES IN PHYSIOGRAPHY. By James H. Smith, Ira W. Stahl and Marion Sykes, of Chicago High Schools. 45 EXERCISES. Boards. Sheets perforated for removing and binding. Size, 8x10 inches. D. C. Heath & Co. 1912.

Physiography has quite generally been looked upon as the most suitable of the sciences for the first year of the high school. Its friends have always maintained that it can not be satisfactorily taught without systematic laboratory work. Laboratory manuals have appeared from time to time and have met with varying degrees of acceptance. The authors of this manual have excellent qualifications for preparing a laboratory course suited to high school pupils, for they are in daily contact with such pupils. They have done the work well. The exercises are reasonably simple, are interesting in themselves, do not call for much costly matrial, are well dis-

tributed over the field, introduce a goodly number of "human' and economic relationships and outline four typical field trips. The atmosphere and climate, and studies of topographic sheets make up somewhat over half of the work. The manual ought to prove thoroughly usuable in city high schools, for it is sane and reasonable in what it demands.

COMMERCIAL AND INDUSTRIAL GEOGRAPHY. By Albert Galloway Keller, and Avard Longley Bishop, of Yale University. 357 pages, 8 vo. Cloth, $1.00. Ginn & Co., 1912.

We have here a book written for use in the seventh and eighth grades, by two university professors. A reviewer at once looks to see if the authors have either "written down" to the pupils or have shot over their heads. One or the other might be expected, but neither seems to have occurred. The style is straight-forward and natural. The material is specific, full of interesting details, and organized upon a definite plan, but one can not help wondering if it ought to be called a *geography*. Strictly geographical relationships are notably subordinated to the economic and social relationships of industry and commerce. Perhaps the latter are more vital and more appealing. They are certainly more interesting than discussions of slopes, drainage, prevailing winds, etc, but some parts of the book get quite a-field from geography. The book discusses man's chief needs—food, shelter, and clothing—and shows how they are supplied. A few representative industries are treated in considerable detail, including rubber, wheat, flour and cotton. The industrial regions of the United States and of the world are accorded a chapter each. Distribution, methods of transportation and of manufacture receive considerable attention. Sets of review questions are grouped at the back of the book. There is only one colored map. Sketch maps are fairly numerous. The chief weakness of the book as a *geography* for the grammar grades is its lack of attention to definite place —or locational—geography. The old text books gave too much space to this. The present tendency is to give too little. The book has so many excellencies that its omissions ought not to be emphasized.

HIGH SCHOOL GEOGRAPHY, PART III., Regional Geography. By Charles R. Dryer. Bound with Parts I and II, to make 536 pages. American Book Co. 1912. $1.30.

Parts I and II appeared some months ago and were reviewed in this Journal in June, 1912. Part III adds fifteen chapters on Regional Geography and makes a complete book for a full year's course. Part III is the most radical departure from old lines yet made in high school geography and the departure is not an unwelcome one. The author divides the earth into some 45 regions, representing fourteen types of climate, grouped under five general heads, viz.: (1) Intertropical, (2) Subtropical and Warm Temperate, (3) Temperate and Intemperate, (4) Cold Temperate, (5) Polar Provinces. The classification of the earth's kinds of cli-

mate under fourteen types is necessarily a matter of the author's personal judgment and may or may not meet with general endorsement. It is doubtful if any two persons, working independently, would hit upon the same classification. Professor Dryer's classification is sane and logical and seems to work out well. The division of the earth into climatic provinces is better than a division into physiographic provinces, although physiography plays a distinct part in Dryer's classification.

Geographers will find plenty of points to differ on, when it comes to blocking off the earth into the forty-five or any other number of subdivisions. For example, the author combines in one region the Mississippi valley, the Appalachian highland and the Atlantic seaboard, calling it the Mississippian Province. Placing North Dakota, Oklahoma, the Carolinas and New England in the same natural region is unusual, but it illustrates the difficulty of establishing fixed boundaries for natural provinces.

Prof. Dryer has set out to blaze a new trail; he has had the courage to do something that seems counter to tradition; and every geographer ought to give him credit for this courage rather than criticise details.

His Regional Geography abounds in paragraphs and sections filled full of interesting matter, some of the very best being the illustrations or supplementary paragraphs in small type. The introduction of scores of these highly interesting and informing paragraphs shedding light upon the life of the people in many parts of the world, terse yet rich in pertinent details, is one of the finest features of the book, and is an encouraging sign of better days in high school geography.

ELEMENTS OF GEOGRAPHY. By R. D. Salisbury, H. H. Barrows and W. S. Tower. ix+616 pp., 7 colored maps, 443 figures. Henry Holt & Co., New York. 1912. 12 mo.

This is the second of the text books in humanized geography to appear within a few months. The authors say in their preface, "The book has been written with the belief that the chief object in geography teaching should be the preparation for citizenship." Good! A little further on, "All rational work in general geography must be founded on physiography." Good! again. This is exactly what we want in geography; exactly what we have been asking for. The book is "elementary" only from the college standpoint. Its style is admirably simple and clear, but the subject-matter has a mature quality that seems to indicate that the authors intend it for advanced high school classes, or even more mature students.

Pure physiography forms only a minor part. The atmosphere and climate are treated at considerable length, receiving 175 pages. Much economic geography is introduced, dealing with soils, minerals, water-powers, waterways, harbors, and the distribution of population, industries and cities. The chapters on The Use and Problems of Inland Waters, on Mountains and Life, and Life in Plains, are the kind of stuff that makes the

red blood of geography. Sets of questions, not based upon the text but calling for thought, are placed at the end of each chapter. They are good and ought to be used. The Geography of the United States is well covered. Foreign countries receive little attention. The book might be summarized as treating of the principles of geography with particular application to the United States. Books of this type will put new life into a study that has been losing ground in the secondary schools. A new epoch in American school geography is beginning and this book will be one that will mold our new courses.

TRENTON, N. J., EXAMINATION QUESTIONS

SIXTH GRADE

One part of question I and question II, compulsory... Answer eight others.

1. a. Briefly describe the production of rubber; conditions of growing; method of gathering; exporting city.
   Name a city of the United States noted for the manufacture of rubber goods, or
   b. Write a short story of coffee
      (a) Conditions necessary for growth
      (b) How plants are cared for and by whom
      (c) When and how long trees produce
      (d) How prepared for market
      (e) Mention principal coffee ports.
3. a. Compare North and South America with regard to size and shape.
   b. Which of the two continents has the more good harbors? Why?
4. Locate these cities and tell why they are important: Rio Janeiro, Para, Montevideo, Iquique, Valparaiso.
5. a. In what heat belts and hemisphere is South America?
   b. Which country of South America has the brightest prospects for future growth? Why?
6. a. Where in South America is there a desert region?
   b. What causes it?
7. Compare the surface of South America with that of North America.
8. a. Name the productive divisions of South America.
   b. Which is the most productive region?
9. Describe the people of South America in regard to races and languages.
10. Names the countries of South America and tell the form of government of each.
11. Give an account of the Panama Canal.
    (a) Who began its construction?
    (b) Why necessary to build it when a railroad already crosses the

Isthmus?

(c) Why so expensive?

(d) What countries will be benefitted?

12. a. In what months of the year is it winter in the southern part of South America?

b. What seasons have they in the Torrid Zone?

13. a. What people were found in South America when the continent was discovered?

b. In what country of South America are many Europeans found?

14. a. Why have some parts of Africa remained unexplored?

b. Name its most important country.

c. Name the chief seaport of that country.

15. a. What exports are obtained from the natives of the interior of Africa?

b. Where are the diamond fields of Africa?

16. a. What prominent American recently returned from Africa?

b. Name two prominent explorers of Central Africa?

17. a. Account for the development of Buenos Ayres and tell the approximate population.

b. What would you expect Buenos Ayres to export and to what country?

18. Write an account of the River Nile:

(a) Its location

(b) Flood, time and result

(c) Value of commerce.

19. a. Name the largest river system of North America, South America, Africa.

a. Tell where each rises and into what each empties.

c. Name an important product of each valley.

Seventh Grade—June, 1911

Answer ten questions.

1. a. Why have cities grown rapidly along the Fall line?

b. Name three such cities.

2. a. What advantages for interior trade has North America?

b. Give five reasons why the United States has become the greatest commercial nation in North America.

3. Tell why Mexico and Central America have not progressed so rapidly as the other countries of North America.

4. a. Compare the density of the population in the valley of the Colorado with that of the Mississippi Valley.

b. Give reasons for the difference.

5. a. To whom does Canada belong?

b. What three products make it especially valuable?

6. Contrast the arrangement of the Highlands of North America with those of Europe and tell the resulting differences.

7. a. To what parts of Europe and North America would you go to see a valley glacier?
   b. What rivers of Europe are fed by melting glaciers?

8. a. In what way does good government promote trade?
   b. Give instances where canals have facilitated land and water commerce.

9. a. Name five of the important exports of the United States.
   b. Name five products which it is necessary for us to import.

10. a. What is the most important commercial nation in the world?
    b. Give three reasons for its importance.

11. a. What has made Germany such a progressive country?
    b. Compare Germany's progress with that of Spain.

12. Locate five of the following cities and give a commercial or historical fact concerning each: Rome, Calcutta, Boston, Hamburg, Athens, Berlin, Glasgow, Constantinople, Quebec, Peking, San Francisco, Vera Cruz.

13. What part of Europe is an important center for sugar beets? Silk? Wine? Coal and iron? Linen? Potatoes? Platinum? Wheat? Rye? Cotton goods?

14. a. Tell where the population is densest in Asia.
    b. Give three reasons.

15. a. What does the United States export to China?
    b. What does China export to us?
    c. What are China's chief ports?
    d. What are the chief obstacles to China's progress?

16. a. For what event is England making preparations?
    b. What have you been reading in the papers about Mexico?

17. Name and locate a city important for silk manufacturing; for steel making; for cotton manufacturing; for exportation of wine; for making of cutlery.

18. a. Has India profited by English control?
    b. What are the great influences that hold her back?

19. Tell where in Europe you would travel to see five of the following: Tomb of Napoleon, The Parthenon, The Catacombs, Westminster Abbey, Vesuvius, The Vatican, The Eiffel Tower, The Home of Shakespeare.

20. a. What is likely to be the line of industrial development in Japan? Why?
    b. Point out similarities between Great Britain and Japan.

21. Describe the Mississippi System and explain how it has influenced the development of the United States west of the Appalachian Highlands.
22. What winds bring rain to your home? Account for the heavy rainfall of the west slope of the Cascade Mountains.

EIGHTH GRADE.

Answer Ten.

1. Name the zones. Tell how they differ from the true heat belts.
2. Over what parts of the earth do the Prevailing Westerlies blow? Over what parts do the Trade Winds blow? What effect has the Atlantic Drift on the climate of the United Kingdom?
3. What causes ocean currents? Why do coastal cities of the United States have a more temperate climate than cities of the same latitude in the Great Central Plain?
4. Why can the United States produce nearly all that we need? What articles would we miss if our supply from other parts of the world were cut off?
5. Locate an important city of each of the following countries and tell why it is important: France, Canada, Italy, Japan, Argentina, China, Brazil, Germany, England, and the Philippine Islands.
6. Why is manufacturing backward in Mexico? Why is commerce limited? Why has Mexico progressed more than most other Spanish countries?
7. Name five leading exports of Canada.
   Name five important cities.
8. Define the following: Continental shelf, raw material, textiles, detritus and estuary.
9. Name a product from each of the following countries: Cuba, Hawaii, Ceylon, Japan, Brazil, Chile, Italy, France, Canada, and China.
10. Name three great commercial nations of Europe. Why have these countries surpassed other European countries?
11. Name three gateways in Europe and Asia controlled by the United Kingdom. Tell what you know of the efforts of Russia to secure seaports in Eastern and Southern Asia.
12. What disadvantage do the people of Great Britain suffer as to food-supply? Name five important colonial possessions of Great Britain.
13. Why has Great Britain such a large navy? Why has Great Britain such a large part of the foreign trade of South America?
14. Why is Africa of so little commercial importance?
    Why are the eyes of Americans directed toward Africa at the present time?
    What do you think of the possibilities for the future development in agriculture? Manufacturing? Civilization?

What European nations have large interests in Africa?

15. Write an account of not less than fifteen lines on United States or Germany, including the following topics: Leading occupations, commercial centers and commercial highways (internal and external).

ON AMERICAN CITIES

THERE are peculiarities in the distribution of American cities that are worthy of comment. Such facts as these, for instance, are not generally known:

Little Massachusetts has more good sized cities than any other state in the Union. It has twenty-five cities of over 25,000 population, while New York has only twenty-one and Pennsylvania only twenty.

There are several states which have one very large city, but absolutely no other which even approaches the leader in size. Everybody knows that Chicago is the first city of Illinois, but few know the name of the second city? While Chicago has over two million people, the next city, Peoria, has only one-thirtieth that number.

While Baltimore has over a half million, the next city of Maryland, Cumberland, has only 22,000.

New Orleans is some twelve times as large as the second city of Louisiana, Shreveport.

Milwaukee has nearly 400,000 people, while Superior, Wisconsin, the second city in the state, has about 40,000.

Neither Iowa, Texas nor Kansas, three of our most prominent states, has a city of 100,000, while Washington has two.

There is only one city in Arkansas—Little Rock—of over 25,000 population, while New Jersey has fourteen.

Although North Carolina was one of the three most populous states in the Union in 1790, it has only two cities of over 25,000 people, while Oklahoma also has two.

We had in 1910 nineteen cities with over a quarter of a million people each. Seven are on the Atlantic (or practically so) five are on the Great Lakes; three are on the Mississippi; two are on the Ohio, two on the Pacific. Only one of these is a southern city, New Orleans. R. H. W.